Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] We claim as our invention the following:

1. A diagnostic golf club system comprising:
a diagnostic golf club comprising a shaft and a club head, the shaft attached to the club head, a plurality of sensors attached to the shaft, each of the plurality of sensors capable of measuring data related to the golf club during a golf swing, an internal memory device capable of receiving and storing data from the plurality of sensors, the internal memory device disposed within the shaft;
a computer for processing the data from the internal memory device; and
an interface mechanism capable of providing communication between the diagnostic golf club and the computer.

[c2] 2. The system according to claim 1 wherein the shaft further comprises a circuit board positioned within a hollow interior of the shaft, the circuit board comprising a power control circuit, a signal conditioning circuit for the plurality of sensors, and a serial communication circuit.

[c3] 3. The system according to claim 1 wherein the golf club is selected from the group consisting of a driver, a fairway wood, an iron and a putter.

[c4] 4. The system according to claim 1 wherein the golf club head is composed of a material selected from the group consisting of plies of pre-preg material, titanium, stainless steel, bi-metal material and persimmon.

[c5] 5. The system according to claim 1 wherein the interface mechanism comprises a connection plug and a serial interface device, the connection plug having a plurality of pins for connection to a plurality of receptors within the shaft for electronically communicating data from the diagnostic golf club to the computer.

[c6] 6. A system for determining the shaft flex profile of the golfer, the system comprising:
a golf club head;
a shaft attached to the golf club head, the shaft having a wall defining a hollow interior, the wall having an exterior surface and an interior surface, the shaft having a tip end in proximity to the golf club head and a butt end opposite thereto, the shaft having an opening to the hollow interior at the butt end;
a first plurality of strain gauges for providing strain

measurements during a golf swing mounted on the exterior surface at the tip end of the shaft, and a second plurality of strain gauges for providing strain measurements during a golf swing mounted on the exterior surface at the butt end of the shaft;

a circuit board positioned within the hollow interior of the shaft, the circuit board comprising a memory circuit for storing the strain measurements, a power control circuit, a first signal conditioning circuit for the first plurality of strain gauges, a second signal conditioning circuit for the second plurality of strain gauges, and a serial communication circuit;

a power source positioned within the hollow interior of the shaft for providing power to the circuit board, the first plurality of strain gauges and the second plurality of strain gauges;

a first plurality of wires connecting the first plurality of strain gauges to the circuit board, and a second plurality of wires connecting the second plurality of strain gauges to the circuit board;

a grip mounted on the butt end of the shaft;

a processor for processing the strain measurements from the first plurality of strain gauges and the second plurality of strain gauges to provide a shaft flex profile for a golfer; and

an interface mechanism for transferring the measure-

ment data from the memory circuit to the processor.

[c7] 7. The system according to claim 6 wherein the first plurality of strain gauges consists of six strain gauges and the second plurality of strain gauges consists of six strain gauges.

[c8] 8. The system according to claim 6 wherein the golf club is selected from the group consisting of a driver, a fairway wood, an iron and a putter.

[c9] 9. The system according to claim 6 wherein the golf club head is composed of a material selected from the group consisting of plies of pre-preg material, titanium, stainless steel, bi-metal material and persimmon.

[c10] 10. The system according to claim 6 wherein the shaft is composed of a material selected from the group consisting of graphite, steel, titanium and a metal graphite composite.

[c11] 11. The system according to claim 7 wherein the six strain gauges of the first plurality of strain gauges are paired, with each pair approximately one-hundred twenty degrees apart for any other pair on the shaft, and the six strain gauges of the second plurality of strain gauges are paired, with each pair approximately one-hundred twenty degrees apart for any other pair on the

shaft.

[c12] 12. The system according to claim 6 wherein the power source is a battery, and the shaft further comprises a protective casing for placement of the battery therein.

[c13] 13. A system for determining the shaft flex profile of the golfer, the system comprising:
a golf club head;
a shaft attached to the club head;
means for measuring the swing loads of a golfer during a golf swing, the load measuring means disposed on the shaft;
means for storing swing load measurements generated by the load measuring means;
means for generating a shaft flex profile for a golfer from the swing load measurements; and
means for transferring the swing load measurements to the generating means.

[c14] 14. A system for determining the shaft flex profile of the golfer, the system comprising:
a golf club head;
a shaft attached to the club head;
means for measuring the axial force on a shaft during a golf swing, the axial force measuring means disposed on the shaft;

means for measuring the transverse shear forces on a shaft during a golf swing, the transverse shear force measuring means disposed on the shaft;
means for measuring the bending moments on a shaft during a golf swing, the bending moments measuring means disposed on the shaft;
means for measuring the torsion on a shaft during a golf swing, the torsion measuring means disposed on the shaft;
means for storing the measurements generated by the axial force measuring means, the transverse shear force measuring means, the bending moments measuring means, and the torsion measuring means;
means for generating a shaft flex profile for a golfer from the measurements; and
means for transferring the measurements to the generating means.

[c15] 15. A method for determining a shaft flex profile for an individual golfer, the method comprising:
activating a golf club having an on-board diagnostics comprising a plurality of sensors mounted on an exterior surface of a shaft of the golf club;
swinging the golf club;
measuring a plurality of strains on the shaft;
downloading the strain measurements to a processor;

calculating a plurality of forces and moments from the swing; and

determining the shaft flex profile for an individual golfer based on the calculations.

[c16] 16. The method according to claim 15 wherein swinging the golf club comprises swinging and striking a golf ball.